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FOREIGN AID AND ECONOMIC GROWTH IN EGYPT AND JORDAN: AN EMPIRICAL ANALYSIS

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Bassam Abu Al-Foul, Dept. of Economics, School of Business & Management, American University of Sharjah, UAE
E-mail: babufoul@aus.edu

Abstract

This paper empirically examines the long-run relationship between per capita real foreign aid and per capita real GDP for Egypt (1960-2005) and Jordan (1965-2005) using a newly developed approach to cointegration by Pesaran et al. (2001) that performs well with small samples and regardless of the orders of the respective time series (it makes no difference whether time series are I (0), I (1), or I (0)/I (1)). The empirical results reveal that in the case of Jordan a long-run relationship exists between the variables, while there is no evidence to support that a long-run relationship exists in the case of Egypt. The Granger causality test supports a long-run causality from foreign aid to GDP in the case of Jordan. However, in the case of Egypt, the results show no support of Granger causality between foreign aid and GDP.

ملخص

تفحص هذه الورقة بطريقة تجريبية العلاقة بعيدة المدى بين ما يخص كل فرد من المساعدات الخارجية ونصيب ذلك الفرد من إجمالي الناتج المحلي في مصر (بين عامي 1960 و2005) وفي الأردن (بين عامي 1965 و2005) وذلك باستخدام أسلوب جديد بالتكامل المشترك وضعه باسران وآخرون (2001) ويؤدي هذا الأسلوب إلى نتائج جيدة مع العينات الصغيرة بغض النظر عن الترتيب والتسلسل الزمني حيث لا فرق بين التسلسل الزمني منحنى (صفر)، ومنحنى (1) أو المنحنى (صفر) / منحنى (1). وتكشف النتائج التجريبية أنه في حالة الأردن فإن هناك علاقة بعيدة المدى بين المتغيرات بينما لا يوجد أي دليل على وجود تلك العلاقة في حالة مصر. و يؤيد اختبار جرانجار للعلاقة السببية فكرة وجود علاقة سببية بعيدة المدى بين المساعدات الخارجية وإجمالي الناتج المحلي في حالة الأردن. أما في حالة مصر فإن النتائج لا تؤيد اختبار جرانجار للعلاقة السببية بين المساعدات الخارجية وإجمالي الناتج المحلي

1. Introduction

The literature is split into two views when it comes to assessing the role of foreign aid in the economic growth of the recipient country. The first advocates that foreign aid contributes positively to economic growth in the recipient country while the second view holds the opposite to be true – that foreign aid has a negative impact on the economy of the recipient country. The empirical investigation on the link between foreign aid and economic growth was more focused on countries outside the Middle East. These studies include, among others, Chenery and Carter (1973), Griffin (1970), Griffin and Enos (1970), Papanek (1973, 1982), Islam (1992), Giles (1994), Mbaku (1993), Murthy, Ukpolo, and Mbaku (1994), Burnside and Dollar (2000), Gounder (2001) and Kosack (2003).

Egypt and Jordan, as classified by the World Bank, are among the lower middle-income countries in the world with a per capita income of about $1490 and $1700 respectively. Both Egypt and Jordan have been on the receiving end of foreign aid. This research will focus on assessing the experience of both Egypt and Jordan with foreign aid by showing the impact of foreign aid and its effectiveness in enhancing economic growth in both countries. Thus the major question that this research needs to answer is whether foreign aid can promote economic growth in both countries or not.

This research will contribute to the literature in the following respect. First, most of the research in the literature has dealt with the relationship between foreign aid and economic growth in developing countries in general with little emphasis on the Middle East and North Africa (MENA) region in particular. So this research will add to the scant literature on the region. Second, this study uses cointegration and error correction modeling that have been used widely in applied econometrics as compared to basic ordinary least squares (OLS) regression method which did not first investigate the properties of time series, and therefore suffers from misleading and fallacious results. Third, by not using cross-section data, as other previous studies have, it will make the results and the findings easier to apply in the case of each country. Therefore, the findings will provide the policymakers with a better guideline to formulate their policies, specifically on how to best use foreign aid to enhance economic growth and development in their countries.

The purpose of this study is to examine the impact of foreign aid on economic growth in both Egypt and Jordan. Using annual data from 1960 to 2005 for Egypt and from 1965 to 2005 for Jordan and an Autoregressive Distributed Lag (ARDL) approach to cointegration as proposed by Pesaran *et al.* (2001), the findings of this study reveal that there is a long-run relationship, over the sample periods, between foreign aid and GDP in the case of Jordan while in the case of Egypt such variables appear to have no long-run relationship between them. When examining the Granger causality between foreign aid and GDP, the test results support a long-run causality from foreign aid to GDP in the case of Jordan. However, in the case of Egypt, the results show no support of Granger causality between foreign aid and GDP.

The rest of the paper is organized as follows. Section 2 presents the model, data and empirical methodology used in the study. Section 3 discusses the empirical results while section 4 concludes the study.

2. The Model, Data and Empirical Methodology

In light of the existing literature, the theoretical model used to examine the relationship between foreign aid and economic growth is:

$$Y = a0 + b1X + \varepsilon \quad \text{.....(1)}$$

where Y is log (per capita real GDP) and X is log (per capita real aid). Data on these variables are annual and obtained from the World Bank's World Development Reports and

covers the periods 1965-2005 and 1960-2005 for Jordan and Egypt, respectively. All the variables are in US dollars.

Cointegration Test: The ARDL approach

The study uses the Autoregressive Distributed Lag (ARDL) approach to cointegration that was proposed by Pesaran *et al.* (2001) which estimates the conditional ARDL model for per capita real GDP and aid given in equation 1 (considering each variable as a dependent variable) as follows:

$$\Delta \mathrm{Y_t} = \alpha_{0\mathrm{Y}} + \sum_{i=1}^{k} \delta_{1Y} \Delta Y_{t-i} + \sum_{i=0}^{k} \delta_{2Y} \Delta X_{t-i} + \gamma_{1Y} Y_{t-1} + \gamma_{2Y} X_{t-1} + \varepsilon \text{.....(2)}$$

$$\Delta X_{\mathrm{t}} = \alpha_{0\mathrm{X}} + \sum_{i=1}^{k} \delta_{1X} \Delta X_{t-i} + \sum_{i=0}^{k} \delta_{2Y} \Delta Y_{t-i} + \gamma_{1X} Y_{t-1} + \gamma_{2X} X_{t-1} + \varepsilon \text{.....(3)}$$

The ARDL approach was used by, among others, Yildirim and Sezgin (2003), Bahmani-Oskooee and Kara (2005), Narayan (2005), Narayan and Narayan (2006), Morley (2006), Nieh and Wang (2005) Feeny (2005), and Liang and Cao (2007). Narayan (2006) argued that the ARDL method proposed by Pesaran *et al.* (2001) can perform well in small samples irrespective of whether the variables are I(0), I(1), or mutually cointegrated, and it is unbiased and efficient. The ARDL approach uses two steps to estimate the long run relationship. The first step is to determine whether a long run relationship exists between the variables in equations 2 and 3 by considering each of the variables as a dependent variable. Then we use the F-test for testing the existence of the long-run relationship in equations 2 and 3. That is, the null hypothesis of no cointegration among variables in equation 2 is tested (H_0: $\gamma_{1Y} = \gamma_{2Y} = 0$) against the alternative hypothesis (H_1: $\gamma_{1Y} \neq \gamma_{2Y} \neq 0$) using the F-test for the joint significance of the lagged levels coefficient in equation 2. In equation 3, when the aid per capita is the dependent variable, the null hypothesis of no cointegration among variables is tested (H_0: $\gamma_{1X} = \gamma_{2X} = 0$) against the alternative hypothesis (H_1: $\gamma_{1X} \neq \gamma_{2X} \neq 0$) using the F-test for the joint significance of the lagged levels coefficient in equation 3. If the estimated F-statistic is greater than the upper bound critical value, we conclude that the variables in question are cointegrated. Also, if the estimated F-statistic falls between the lower and the upper bound critical values, the decision about cointegration among the variables involved is inconclusive. And if the estimated F-statistic is less than the lower critical value, the null hypothesis of no cointegration cannot be rejected. The second step – if the long-run relationship is established between the variables– is to estimate the long-run and the short-run coefficients using the ARDL approach.

Granger Causality

If the cointegration test results reveal that the variables are cointegrated, we then use the Vector Error Correction (VEC) model estimation as in equations 4 and 5. However, if the variables are not cointegrated we use a Vector Autoregressive (VAR) model in the first difference in the estimation given that both variables are I(1).

$$\Delta \mathrm{Y_t} = \alpha_{0\mathrm{Y}} + \sum_{i=1}^{k} \delta_{1Y} \Delta Y_{t-i} + \sum_{i=1}^{k} \delta_{2Y} \Delta X_{t-i} + \lambda_1 EC_{t-1} + \varepsilon \text{.....(4)}$$

$$\Delta X_{\mathrm{t}} = \alpha_{0\mathrm{X}} + \sum_{i=1}^{k} \delta_{1X} \Delta X_{t-i} + \sum_{i=1}^{k} \delta_{2Y} \Delta Y_{t-i} + \lambda_2 EC_{t-1} + \varepsilon \text{.....(5)}$$

where EC_{t-1} is the lagged error correction term.

3. Empirical Results

Unit Root Test

Although unit root test is not required for testing for cointegration using the ARDL approach, it is necessary for conducting the Granger causality test. We use the Augmented Dickey-Fuller (ADF) test for conducting the unit root test. The ADF tests the null hypothesis of nonstationarity. Table 1 shows the ADF test results for both X and Y series as defined above. The ADF test results show that both variables X and Y are nonstationary in their levels and stationary in their first difference in both countries (see Table 1 in the appendix).

Cointegration Test: The ARDL approach

Before estimating equation 1 in the case of each country, the existence of the long-run relationship between the variables involved was investigated by calculating the F-statistics. In the case of Jordan, when estimating equation 2, the computed F-statistic $F_Y(Y/X)$ is 5.74 which is higher than the upper bound critical values of 5.73 and 4.78 at the 5% and 10% significance levels, respectively. This means that the null hypothesis of no cointegration is rejected when Y is the dependent variable and that there is a long run relationship between the variables involved (see Table 2 in the appendix). However, when using equation 3, where X is the dependent variable, the null hypothesis of no cointegration cannot be rejected since the computed F-statistic $F_X(X/Y)$ is 1.30 which is less than the lower bound critical values of 4.94 and 4.04 at the 5% and 10% significance levels, respectively (see Table 2 in the appendix).

In the case of Egypt, when estimating equation 2, the computed F-statistic $F_Y(Y/X)$ is 2.71 which is less than the lower bound critical values of 4.94 and 4.04 at the 5% and 10% significance levels, respectively. This means that the null hypothesis of no cointegration cannot be rejected when Y is the dependent variable (see Table 2 in the appendix). However, when using equation 2, where X is the dependent variable, the null hypothesis of no cointegration cannot be rejected since the computed F-statistic $F_X(X/Y)$ is 1.87 which is less than the lower bound critical values of 4.94 and 4.04 at the 5% and 10% significance levels, respectively (see Table 2 in the appendix).

The results also reveal that the short run effects of X on Y can be shown from the sign and the significance of the coefficient δ_{2Y} in equation 2, whereas the sign and the significance of the coefficient γ_{2Y} in equation 2 reveals the long-run effects of X on Y. For example, in the case of Jordan, the results show that the coefficient γ_{2Y} is positive and significant at 1% significance level indicating that there is a long-run relationship between X and Y. This result supports the result of cointegration between X and Y using the ARDL approach. With respect to Egypt, the results support the findings of the ARDL method that no long-run relationship exists between X and Y.

Granger Causality

When two variables are cointegrated then Granger causality exists in at least one direction. In the case of Jordan, the cointegration test results reveal that real per capita GDP and foreign aid are cointegrated, thus Granger causality will exist at least in one direction between the variables. Using equation 4, the result shows a significant t-statistics for the coefficient (λ_1) of the error correction term. This implies that Granger causality runs from aid to GDP growth in the long-run.

In the case of Egypt, the results of VAR model (as in equations 4 and 5 excluding error correction terms) suggest that Granger causality does not exist in either direction between per capita GDP and aid.

4. Conclusion

This study empirically examines the relationship between foreign aid and the GDP growth in the case of Egypt (1960-2005) and Jordan (1965-2005) using the newly developed ARDL approach. The results reveal that there is a positive long-run relationship between foreign aid and GDP in the case of Jordan and that foreign aid affect GDP growth in Jordan. However, in the case of Egypt, the empirical results reveal that no long-run relationship exists between foreign aid and GDP over the period examined. When testing for Granger causality, the results show that foreign aid Granger causes GDP in the long run and that causality runs from aid to GDP. While for Egypt, the results reveal that no granger causality exist between aid and GDP. However, these results should be interpreted with caution since they may be affected by the size of the dataset. If we could obtain a larger dataset it may be useful to disaggregate foreign aid and add other policy variables and see how this affects the economy.

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Appendix:

Table 1 : The ADF Unit Root Test Results

Country	Variable	Levels (*L*)	Augmented Dickey-Fuller (ADF) Test Statistic: CV	First Difference (*L*)	CV
Egypt:	X	- 1.6694 (1)	-3.5155	- 3.1397 (2)	-2.933
(1960-2005)	Y	- 2.2012 (1)	-3.5155	- 3.9453 (0)	-2.930
Jordan:	X	- 2.0851 (0)	-3.5266	- 6.0730 (1)	-2.941
(1965-2005)	Y	- 1.8937 (1)	-3.5297	- 4.4118 (0)	-2.939

Notes: Variables X and Y are, respectively, the log of real per capita foreign aid and real per capita GDP. *L* denotes the lag lengths elected using SIC, and CV denotes critical values at 5% significance level.

Table 2: The Bound Testing for Cointegration

Country	Lag	Dependent Variable	F-statistic
Egypt	1	ΔY	2.71
	1	ΔX	1.87
Jordan	1	ΔY	5.74*
	1	ΔX	1.30

Notes: Variables X and Y are, respectively, the log of real per capita foreign aid and real per capita GDP. The upper bound critical values for F-statistic are 5.73 and 4.78 at the 5% and 10% significance levels, respectively. And the lower bound critical values for F-statistics are 4.94 and 4.04 at the 5% and 10% significance levels, respectively. These critical values are obtained from Pesaran et al. (2001) Table CI(iii) Case III, p. 300.
* Significant at 5%.